

**VOLTAGE DETECTOR****AZ70XX****General Description**

The AZ70XX series ICs are under voltage detectors with a built in voltage threshold and low power consumption. The AZ70XX are specifically designed to accurately monitor power supplies.

The AZ70XX use a precision on-chip voltage reference and a comparator to measure the input operating voltage. These ICs can accurately reset the system after detecting voltage at the time of switching power on and instantaneous power off in various CPU systems and other logic systems. The detect voltage thresholds are 2.3V/2.5V/2.7V/2.9V/3.1V/3.3V/4.2V/4.5V for AZ7023/25/27/29/31/33/42/45 respectively. Built in hysteresis helps to prevent erratic operation in the presence of noise.

The AZ70XX series are available in 2 standard packages: TO-92 (bulk or ammo packing) and SOT-89-3.

Features

- Low Current Consumption:
 $I_{CCL}=300\mu\text{A}$ Typical
 $I_{CCH}=30\mu\text{A}$ Typical
- Low Minimum Operating Voltage for Output Resetting: 0.8V Typical
- Built in Hysteresis Voltage: 50mV Typical
- Open Collector Output
- Extended Temperature Range: -40 to 85°C

Applications

- Low Battery Voltage Detector
- Power Fail Indicator
- Processor Reset Generator
- Battery Backup Control
- Home Electric Appliances

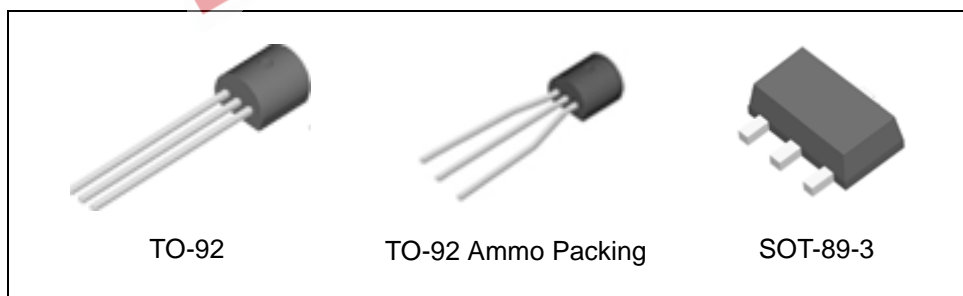


Figure 1. Package Types of AZ70XX



VOLTAGE DETECTOR

AZ70XX

Pin Configuration

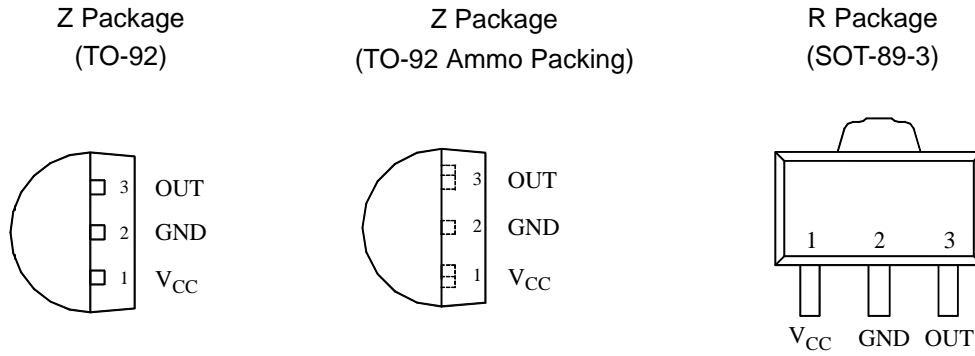


Figure 2. Pin Configuration of AZ70XX (Top View)

Functional Block Diagram

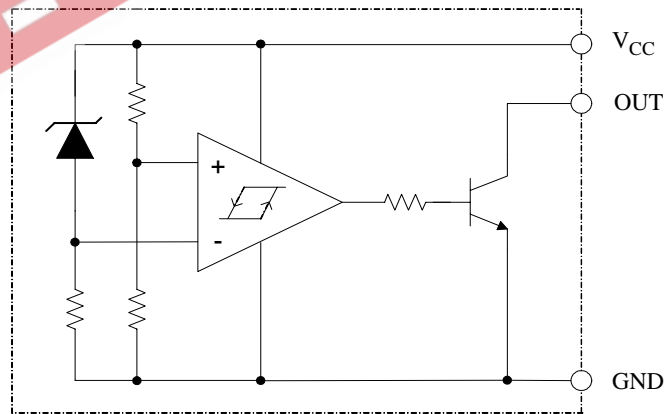


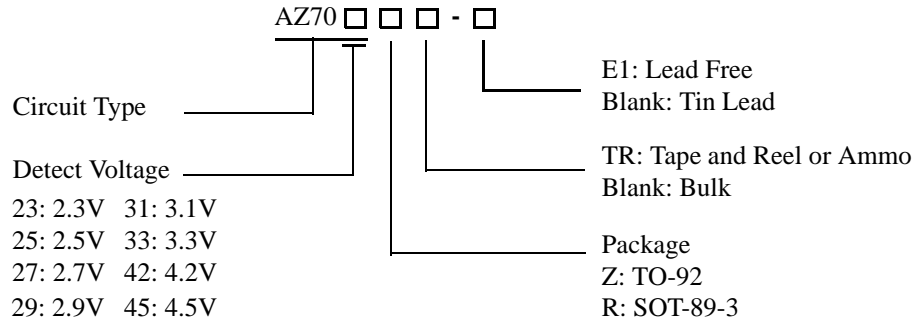
Figure 3. Functional Block Diagram of AZ70XX



VOLTAGE DETECTOR

AZ70XX

Ordering Information



| Package | Temperature Range | Detect Voltage | Part Number | | Marking ID | | Packing Type |
|----------|-------------------|----------------|-------------|--------------|------------|------------|--------------|
| | | | Tin Lead | Lead Free | Tin Lead | Lead Free | |
| TO-92 | -40 to 85°C | 2.3V | AZ7023Z | AZ7023Z-E1 | AZ7023Z | AZ7023Z-E1 | Bulk |
| | | | AZ7023ZTR | AZ7023ZTR-E1 | AZ7023Z | AZ7023Z-E1 | Ammo |
| | | 2.5V | AZ7025Z | AZ7025Z-E1 | AZ7025Z | AZ7025Z-E1 | Bulk |
| | | | AZ7025ZTR | AZ7025ZTR-E1 | AZ7025Z | AZ7025Z-E1 | Ammo |
| | | 2.7V | AZ7027Z | AZ7027Z-E1 | AZ7027Z | AZ7027Z-E1 | Bulk |
| | | | AZ7027ZTR | AZ7027ZTR-E1 | AZ7027Z | AZ7027Z-E1 | Ammo |
| | | 2.9V | AZ7029Z | AZ7029Z-E1 | AZ7029Z | AZ7029Z-E1 | Bulk |
| | | | AZ7029ZTR | AZ7029ZTR-E1 | AZ7029Z | AZ7029Z-E1 | Ammo |
| | | 3.1V | AZ7031Z | AZ7031Z-E1 | AZ7031Z | AZ7031Z-E1 | Bulk |
| | | | AZ7031ZTR | AZ7031ZTR-E1 | AZ7031Z | AZ7031Z-E1 | Ammo |
| | | 3.3V | AZ7033Z | AZ7033Z-E1 | AZ7033Z | AZ7033Z-E1 | Bulk |
| | | | AZ7033ZTR | AZ7033ZTR-E1 | AZ7033Z | AZ7033Z-E1 | Ammo |
| | | 4.2V | AZ7042Z | AZ7042Z-E1 | AZ7042Z | AZ7042Z-E1 | Bulk |
| | | | AZ7042ZTR | AZ7042ZTR-E1 | AZ7042Z | AZ7042Z-E1 | Ammo |
| | | 4.5V | AZ7045Z | AZ7045Z-E1 | AZ7045Z | AZ7045Z-E1 | Bulk |
| | | | AZ7045ZTR | AZ7045ZTR-E1 | AZ7045Z | AZ7045Z-E1 | Ammo |
| SOT-89-3 | -40 to 85°C | 2.3V | AZ7023RTR | AZ7023RTR-E1 | 7023R | E723 | Tape & Reel |
| | | 2.5V | AZ7025RTR | AZ7025RTR-E1 | 7025R | E725 | Tape & Reel |
| | | 2.7V | AZ7027RTR | AZ7027RTR-E1 | 7027R | E727 | Tape & Reel |
| | | 2.9V | AZ7029RTR | AZ7029RTR-E1 | 7029R | E729 | Tape & Reel |
| | | 3.1V | AZ7031RTR | AZ7031RTR-E1 | 7031R | E731 | Tape & Reel |
| | | 3.3V | AZ7033RTR | AZ7033RTR-E1 | 7033R | E733 | Tape & Reel |
| | | 4.2V | AZ7042RTR | AZ7042RTR-E1 | 7042R | E742 | Tape & Reel |
| | | 4.5V | AZ7045RTR | AZ7045RTR-E1 | 7045R | E745 | Tape & Reel |

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

**VOLTAGE DETECTOR****AZ70XX****Absolute Maximum Ratings (Note 1)**

| Parameter | Symbol | Value | Unit |
|-----------------------------------------------------------------------|-----------|-----------------------|--------------------|
| Supply Voltage | V_{CC} | -0.3 to 20 | V |
| Power Dissipation (Package Limitations, $T_A=25^{\circ}\text{C}$) | P_D | TO-92 Package: 400 | mW |
| | | SOT-89-3 Package: 500 | |
| Operating Junction Temperature | T_J | 150 | $^{\circ}\text{C}$ |
| Storage Temperature Range | T_{STG} | -65 to 150 | $^{\circ}\text{C}$ |

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

| Parameter | Symbol | Min | Max | Unit |
|-----------------------------|----------|-----|-----|--------------------|
| Supply Voltage | V_{CC} | | 18 | V |
| Operating Temperature Range | T_A | -40 | 85 | $^{\circ}\text{C}$ |



VOLTAGE DETECTOR

AZ70XX

Electrical Characteristics

T_A=25°C, unless otherwise specified.

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit | |
|----------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------|-------|-----|-------|---|
| Detect Voltage | V _{DET} | R _L =200Ω (Note 2) V _{OL} ≤ 0.4V | AZ7023R/Z | 2.15 | 2.3 | 2.45 | V |
| | | | AZ7025R/Z | 2.35 | 2.5 | 2.65 | |
| | | | AZ7027R/Z | 2.55 | 2.7 | 2.85 | |
| | | | AZ7029R/Z | 2.75 | 2.9 | 3.05 | |
| | | | AZ7031R/Z | 2.95 | 3.1 | 3.25 | |
| | | | AZ7033R/Z | 3.15 | 3.3 | 3.45 | |
| | | | AZ7042R/Z | 4.05 | 4.2 | 4.35 | |
| | | | AZ7045R/Z | 4.35 | 4.5 | 4.65 | |
| Low-level Output Voltage | V _{OL} | V _{CC} =V _{DET} (min)-0.05V R _L =200Ω (Note 2) | | | 0.4 | V | |
| Output Leakage Current | I _{OH} | V _{CC} =15V | | | 0.1 | μA | |
| Hysteresis Voltage | V _{HYS} | R _L =200Ω (Note 2) | 30 | 50 | 100 | mV | |
| Detect Voltage Temperature Coefficient | $\frac{\Delta V_{DET}}{V_{DET}} \times \Delta T$ | R _L =200Ω (Note 2) | | ±0.01 | | % /°C | |
| Circuit Current at On Time | I _{CCL} | V _{CC} =V _{DET} (min)-0.05V | | 300 | 500 | μA | |
| Circuit Current at Off Time | I _{CCH} | V _{CC} =5.25V | | 30 | 50 | μA | |
| Minimum Operating Voltage | V _{OPR} | R _L =200Ω (Note 2) V _{OL} ≤ 0.4V | | 0.8 | | V | |
| “L” Transmission Delay Time | tpHL | V _{CC} changed from 5.25V to V _{DET} (min)-0.05V, R _L =1.0KΩ, C _L =100p (Note 3) | | 10 | | μs | |
| “H” Transmission Delay Time | tpLH | V _{CC} changed from V _{DET} (min)-0.05V to 5.25V, R _L =1.0KΩ, C _L =100p (Note 3) | | 15 | | μs | |
| Output Current at On Time | I _{OL I} | V _{CC} =V _{DET} (min)-0.05V T _A =25°C (Note 4) | 20 | | | mA | |
| | I _{OL II} | V _{CC} =V _{DET} (min)-0.05V T _A =-40 to 85 °C (Note 4) | 16 | | | | |

Note 2: See test circuit 1 and Figure 12.

Note 3: See test circuit 2 and Figure 12.

Note 4: See test circuit 3. Adjusting the regulative power source until the reading value of voltage meter V is 0.4V, the reading value of current meter A is defined as "Output Current at On Time".



VOLTAGE DETECTOR

AZ70XX

Electrical Characteristics (Continued)

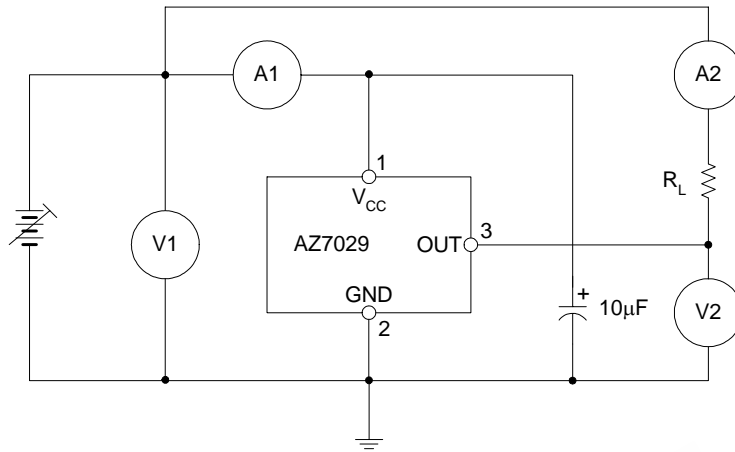


Figure 4. Test Circuit 1

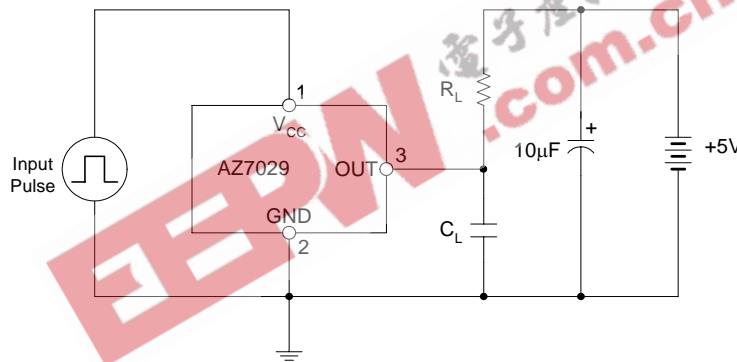


Figure 5. Test Circuit 2

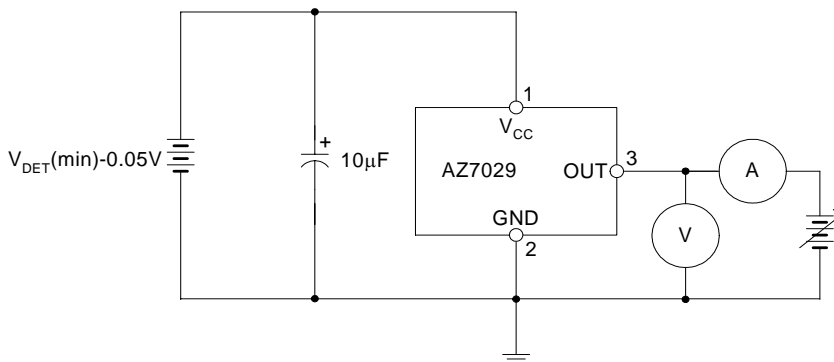


Figure 6. Test Circuit 3



VOLTAGE DETECTOR

AZ70XX

Typical Performance Characteristics

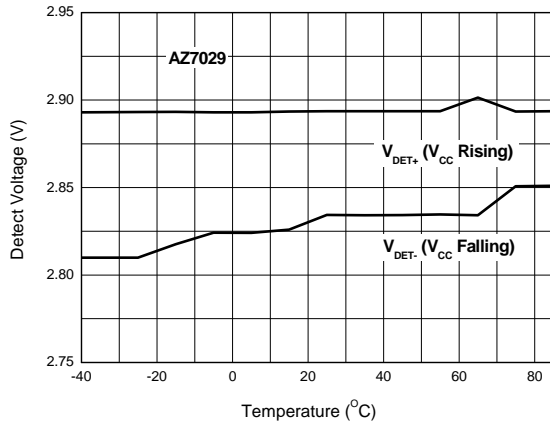


Figure 7. Detect Voltage vs. Temperature

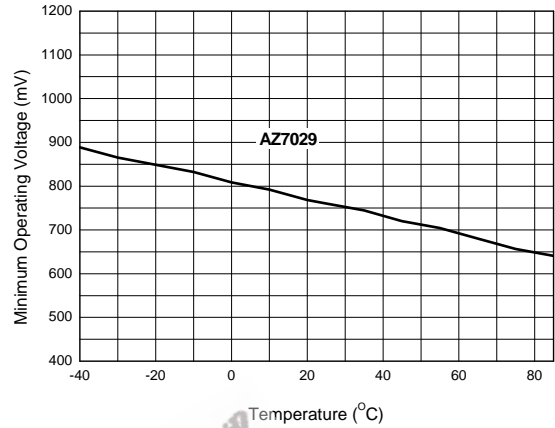


Figure 8. Minimum Operating Voltage vs. Temperature

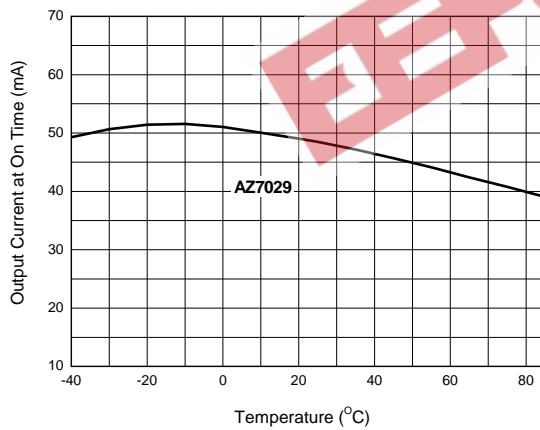


Figure 9. Output Current at On Time vs. Temperature

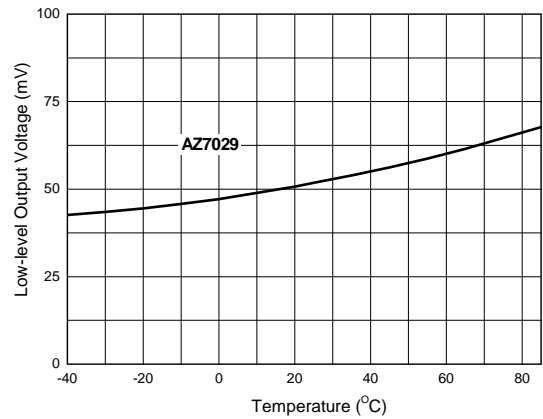


Figure 10. Low-level Output Voltage vs. Temperature



VOLTAGE DETECTOR

AZ70XX

Typical Performance Characteristics (Continued)

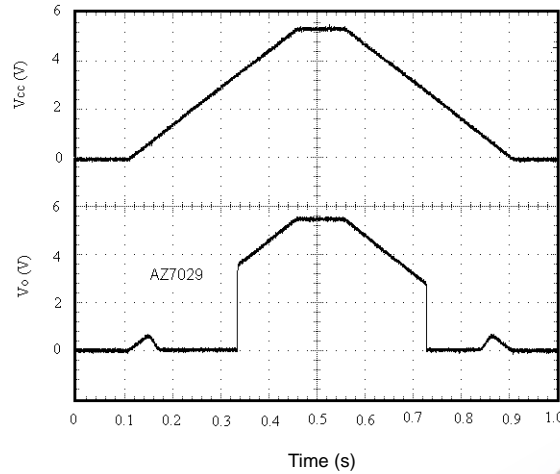


Figure 11. Output Voltage Dynamic Response when V_{CC} Increases and Decreases

Operating Diagram

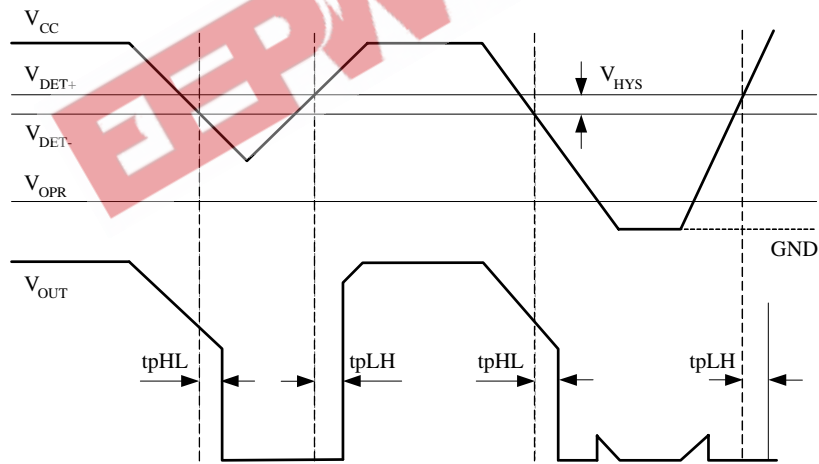


Figure 12. AZ70XX Timing Waveform (Note 5)

Note 5: Detect voltage: V_{DET-}

Hysteresis voltage (V_{HYS}): $V_{DET+} - V_{DET-}$

Release voltage: V_{DET+}

Minimum operating voltage: V_{OPR}



VOLTAGE DETECTOR

AZ70XX

Operating Diagram (Continued)

Figure 12 is a typical timing waveform for AZ70XX. In normal steady-state operation when $V_{CC} > V_{DET-}$, the output will be in a logic high state and V_{OUT} is dependent upon the voltage that the pull-up resistor connected to.

Here is some explanations for AZ70XX's operation.

1. When the input voltage V_{CC} falls below V_{DET-} , the output will pull down to logic low after a delay time of t_{pHL} . In general, at rated output current and V_{CC} , V_{OUT} can be pulled down to a voltage as low as within 0.4V from GND. (See the Electrical Characteristics section). The voltage level V_{DET-} means the detect voltage.

2. The output, V_{OUT} , will stay valid until V_{CC} falls below the minimum operating voltage, V_{OPR} (0.8V

typical). Below minimum operating voltage, the output is undefined.

3. During power-up, V_{OUT} will remain undefined until V_{CC} rises above V_{OPR} , at which time the output will become valid. V_{OUT} will be in its active low state while $V_{OPR} < V_{CC} < V_{DET+}$ ($V_{DET+} = V_{DET-} + V_{HYS}$). V_{DET+} is the release voltage. V_{HYS} means the hysteresis voltage and is the difference voltage between the V_{DET+} and V_{DET-} .

4. When V_{CC} rises above V_{DET+} , the output will be in its inactive state. After a delay time of t_{pLH} , V_{OUT} will be in its logic high state .

Typical Applications

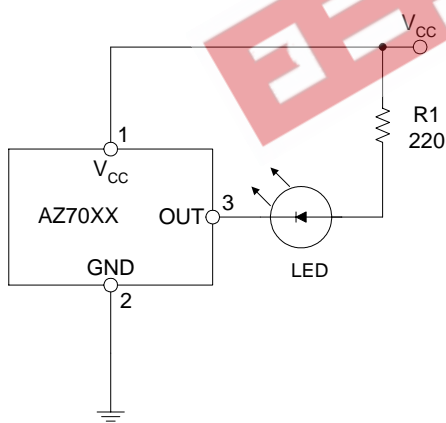


Figure 13. Low Voltage Indicator

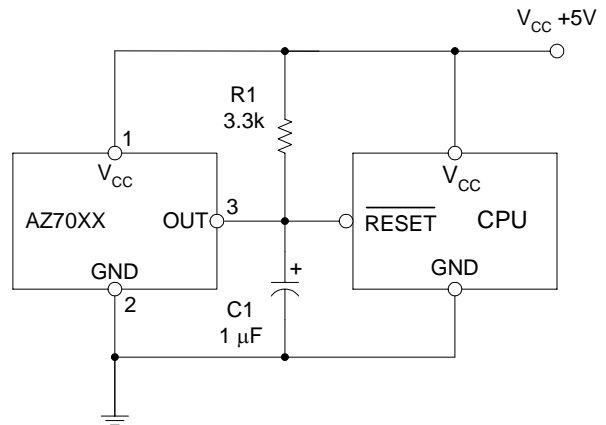


Figure 14. CPU Resetting Circuit



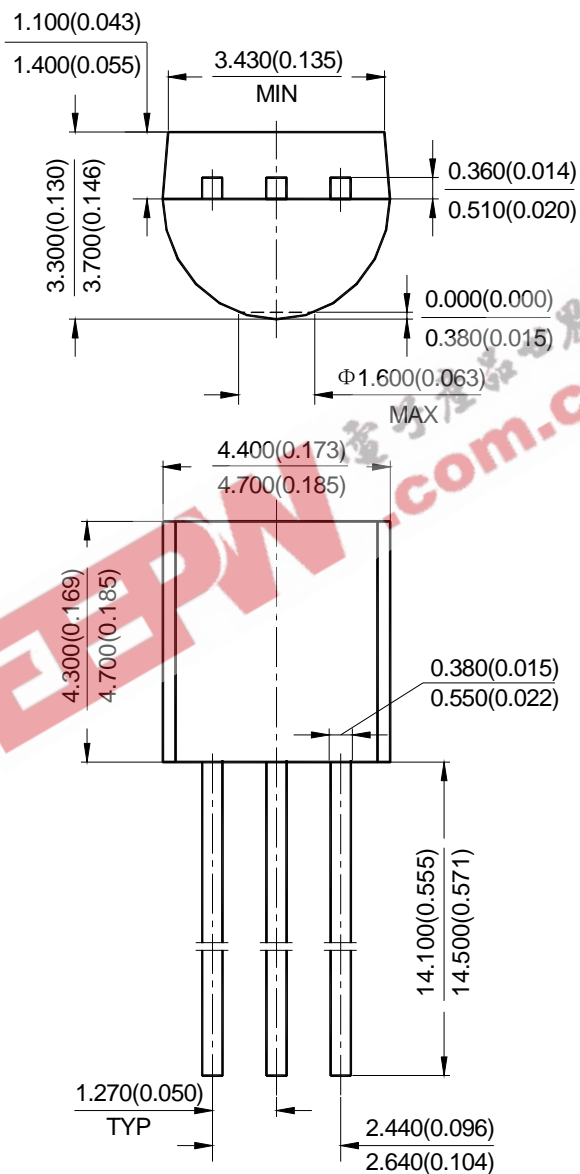
VOLTAGE DETECTOR

AZ70XX

Mechanical Dimensions

TO-92

Unit: mm(inch)





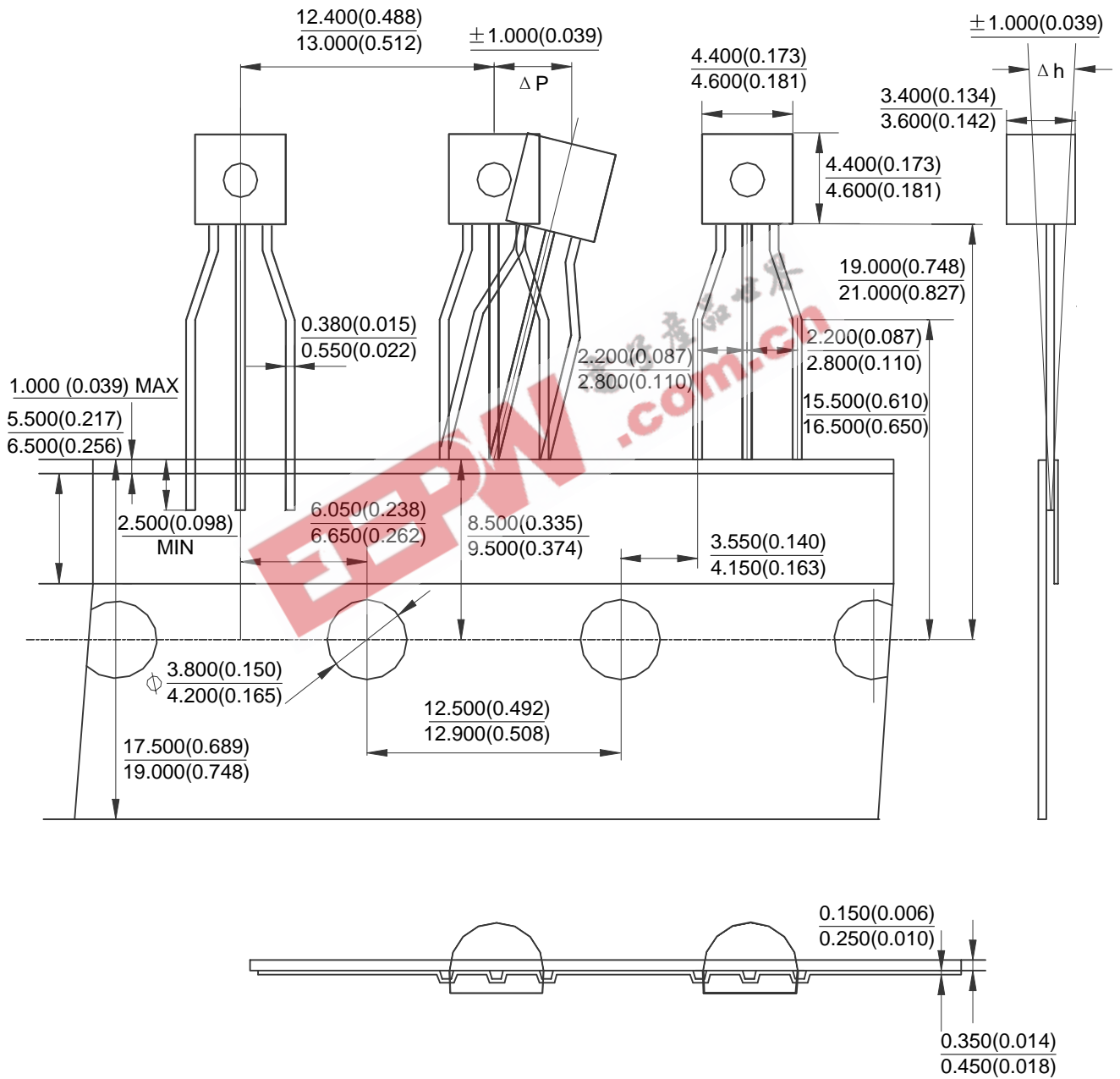
VOLTAGE DETECTOR

AZ70XX

Mechanical Dimensions (Continued)

TO-92 Ammo Packing

Unit: mm(inch)





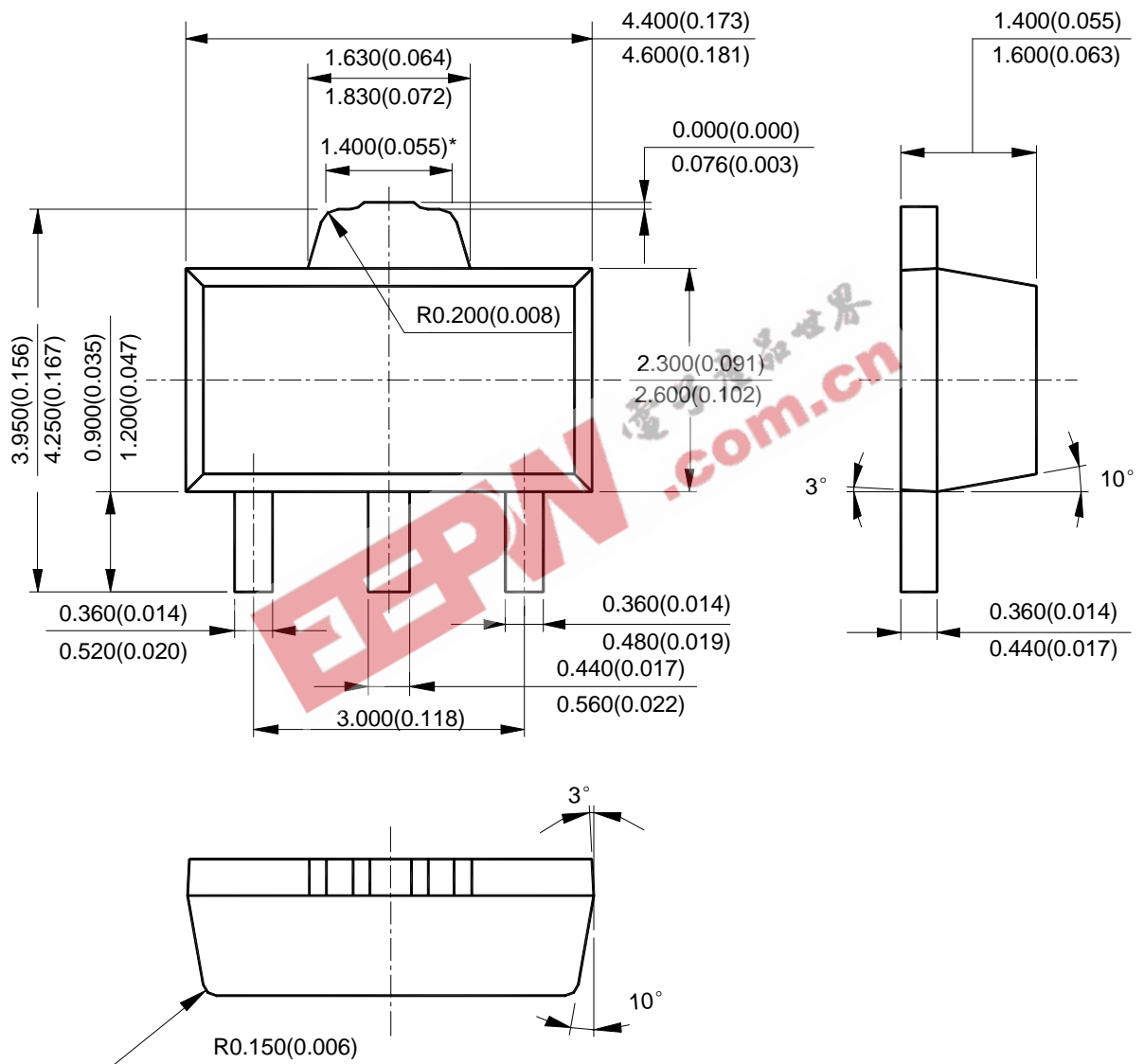
VOLTAGE DETECTOR

AZ70XX

Mechanical Dimensions (Continued)

SOT-89-3

Unit: mm(inch)





BCD Semiconductor Manufacturing Limited

<http://www.bcdsemi.com>

EEPW.com.cn 电子产品世界

IMPORTANT NOTICE

BCD Semiconductor Manufacturing Limited reserves the right to make changes without further notice to any products or specifications herein. BCD Semiconductor Manufacturing Limited does not assume any responsibility for use of any its products for any particular purpose, nor does BCD Semiconductor Manufacturing Limited assume any liability arising out of the application or use of any its products or circuits. BCD Semiconductor Manufacturing Limited does not convey any license under its patent rights or other rights nor the rights of others.

MAIN SITE

BCD Semiconductor Manufacturing Limited
- Wafer Fab
Shanghai SIM-BCD Semiconductor Manufacturing Limited
800, Yi Shan Road, Shanghai 200233, China
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

BCD Semiconductor Manufacturing Limited
- IC Design Group
Advanced Analog Circuits (Shanghai) Corporation
8F, Zone B, 900, Yi Shan Road, Shanghai 200233, China
Tel: +86-21-6495 9539, Fax: +86-21-6485 9673

REGIONAL SALES OFFICE

Shenzhen Office
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd. Shenzhen Office
Advanced Analog Circuits (Shanghai) Corporation Shenzhen Office
Room E, 5F, Noble Center, No.1006, 3rd Fuzhong Road, Futian District, Shenzhen 518026, China
Tel: +86-755-8826 7951
Fax: +86-755-8826 7865

Taiwan Office
BCD Semiconductor (Taiwan) Company Limited
4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei, Taiwan
Tel: +886-2-2656 2808
Fax: +886-2-2656 2806

USA Office
BCD Semiconductor Corporation
30920 Huntwood Ave. Hayward, CA 94544, U.S.A
Tel: +1-510-324-2988
Fax: +1-510-324-2788